

What is claimed is:

1. A medical electrical lead, comprising:
  - an elongated body including a proximal end, a distal end, and a conductor extending from the proximal end toward the distal end;
  - an insulative housing formed about the distal end of the body and including a cavity and a port;
  - a conductive structure formed within the cavity, coupled to the conductor and including an electrode surface contained within the cavity;
  - an ionically conductive medium filling the cavity in intimate contact with the electrode surface; and
  - an insulated helical fixation member coupled to the distal end of the body and extending distally from the distal end;

wherein, when a current is delivered, via the conductor, to the electrode surface contained within the cavity, a first current density is generated at the electrode surface and a second current density is generated out from the port of the insulative housing, the first current density being smaller than the second current density; and

when the helical fixation member is engaged in tissue, the port forms a high impedance and low polarization tissue-stimulating electrode.
2. The lead of claim 1, wherein the conductive structure formed within the cavity further includes a second electrode surface circumscribed by the port of the cavity from which the second current density is generated.
3. The lead of claim 2, wherein the second electrode surface area is approximately flush with the port.
4. The lead of claim 2, wherein the second electrode surface area protrudes from the port.
5. The lead of claim 4, wherein the second electrode surface pierces tissue when the helical fixation member is engaged in tissue.

6. The lead of claim 2, wherein the second electrode surface is smooth such that a microscopic surface area of the second electrode surface is not significantly greater than a macroscopic surface area of the second electrode surface.
7. The lead of claim 2, wherein the conductive structure formed within it the cavity comprises a proximal extension of the helical fixation member.
8. The lead of claim 2, wherein the conductive structure formed within the cavity comprises a stud joining the helical fixation member to the conductor.
9. The lead of claim 1, wherein the port of the insulative housing has a cross-sectional area between approximately 0.1 square millimeters and 4.0 square millimeters.
10. The lead of claim 1, wherein the electrode surface of the conductive structure is approximately greater than or equal to approximately 10 square millimeters.
11. The lead of claim 1, wherein the conductive structure formed within it the cavity comprises a proximal extension of the helical fixation member.
12. The lead of claim 11, wherein the helical fixation member includes an un-insulated zone forming a second electrode surface distal from the port from which the second current density is generated.
13. The lead of claim 1, wherein the conductive structure formed within the cavity comprises a stud joining the helical fixation member to the conductor.

14. The lead of claim 1, wherein the ionically conductive medium filling the cavity comprises a hydrogel.
15. The lead of claim 1, wherein the ionically conductive medium filling the cavity comprises a saline solution.
16. The lead of claim 1, wherein the helical fixation member is retractable into the insulative housing and extendable therefrom.
17. The lead of claim 1, wherein the electrode surface of the conductive structure comprises platinum black particles.
18. The lead of claim 1, wherein the electrode surface of the conductive structure comprises an iridium-oxide.
19. The lead of claim 1, wherein the electrode surface of the conductive structure comprises a ruthenium-oxide.
20. The lead of claim 1, wherein the electrode surface of the conductive structure comprises titanium-nitride.
21. The lead of claim 1, further comprising a steroid-loaded MCRD formed about the insulative housing in proximity to the port.
22. The lead of claim 1, wherein the insulated helical fixation member comprises an oxide-coated tantalum.
23. A medical electrical lead, comprising:
  - an elongated body including a proximal end, a distal end, and a conductor extending from the proximal end toward the distal end;
  - an insulative housing formed about the distal end of the body and including a cavity and a port;

a conductive structure formed within the cavity, coupled to the conductor and including a first electrode surface contained within the cavity and a second electrode surface circumscribed by the port; and

an ionically conductive medium filling the cavity in intimate contact with the first electrode surface;

wherein, when a current is delivered, via the conductor, to the first electrode surface contained within the cavity, a first current density is generated at the first electrode surface and a second current density is generated at the second electrode surface, the first current density being smaller than the second current density so that the second electrode surface circumscribed by the port forms a high impedance and low polarization stimulating electrode.

24. The lead of claim 23, wherein the second electrode surface area is approximately flush with the port.

25. The lead of claim 23, wherein the second electrode surface area protrudes from the port.

26. The lead of claim 23, wherein the second electrode surface is smooth such that a microscopic surface area of the second electrode surface is not significantly greater than a macroscopic surface area of the second electrode surface.

27. The lead of claim 23, wherein the second electrode surface of the conductive structure has a surface area between approximately 0.1 square millimeters and 4.0 square millimeters.

28. The lead of claim 23, wherein the first electrode surface of the conductive structure is approximately greater than or equal to approximately 10 square millimeters.

29. The lead of claim 23, wherein the ionically conductive medium filling the cavity comprises a hydrogel.
30. The lead of claim 23, wherein the ionically conductive medium filling the cavity comprises a saline solution.
31. The lead of claim 23, wherein the first electrode surface of the conductive structure comprises platinum black particles.
32. The lead of claim 23, wherein the first electrode surface of the conductive structure comprises an iridium-oxide.
33. The lead of claim 23, wherein the first electrode surface of the conductive structure comprises a ruthenium-oxide.
34. The lead of claim 23, wherein the first electrode surface of the conductive structure comprises titanium-nitride.
35. The lead of claim 23, further comprising a steroid-loaded MCRD formed about the insulative housing in proximity to the port.